



# Silvopastoral management for quality wood production

ML López Díaz, G Moreno, M Bertomeu

Forest Research Group, University of Extremadura (Spain)

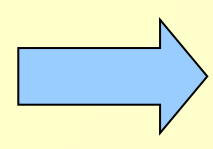
gmoreno@unex.es



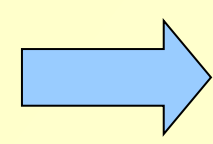
## INTRODUCTION

### Intensive management for quality wood production:

- Fertilization
- Irrigation
- Control of tree-herbage competition



Rotation length reduction



Economical (45%) and environmental costs

## MATERIALS AND METHODS

### VEGETATION CONTROL:

- Clearing
- Ploughing
- Silvopastoral

X

### IRRIGATION:

- I low: Field capacity
- I medium: I low x 2
- I high: I low x 3

Bosques naturales SL  
15-year old hybrid walnut  
plantation  
Density 333 trees ha<sup>-1</sup>

Plots = 20 x 3 trees  
3 replications, 54 plots



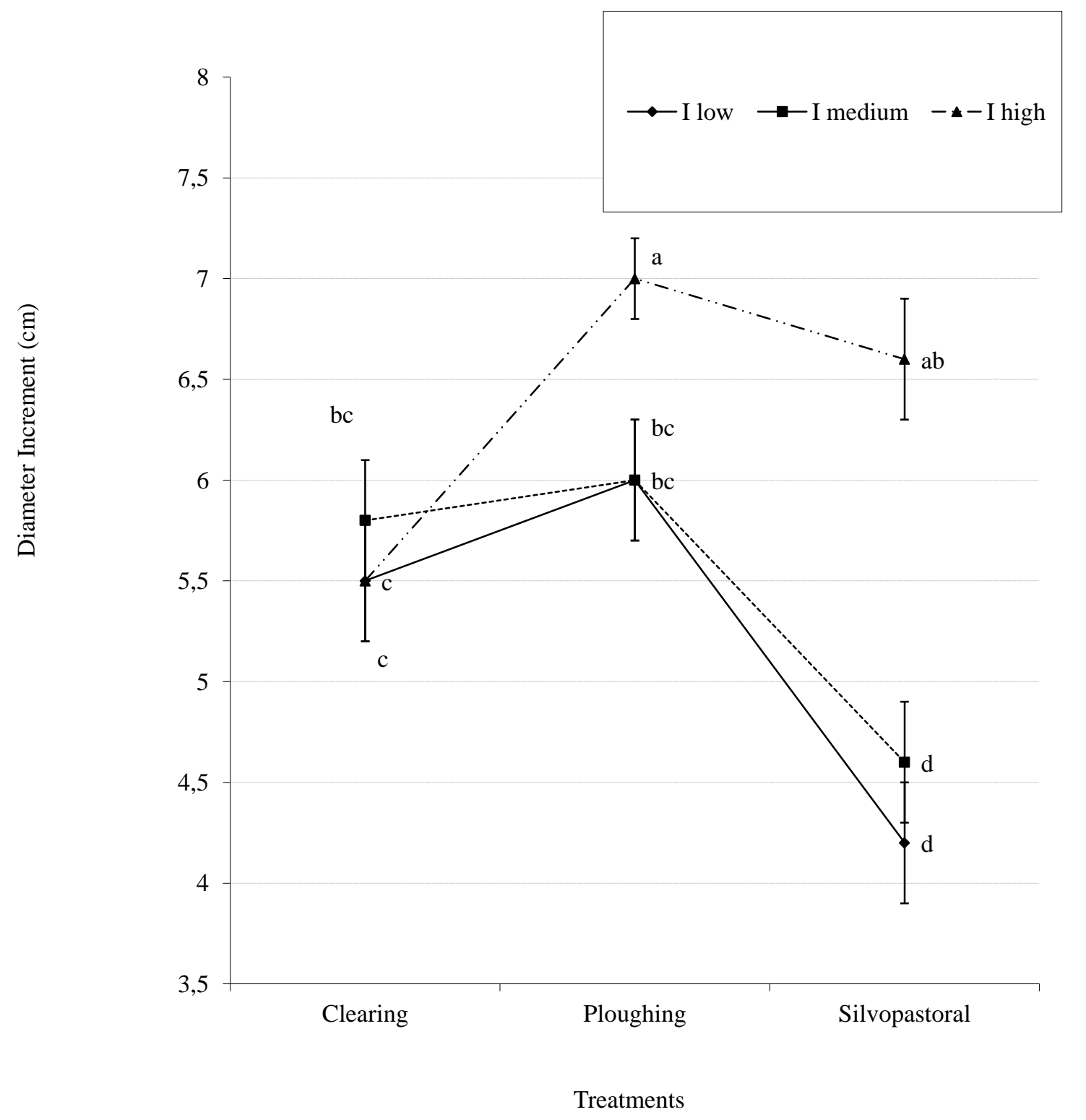
## RESULTS



Nutrient ( $\mu\text{g}$  / 50 cm<sup>2</sup>. month) availability and OM content (mg kg<sup>-1</sup>) in soil, and nitrate leaching (mg N-NO<sub>3</sub><sup>-</sup> l<sup>-1</sup>)

Tree diameter increment

Treatments	Elements	Clearing	Ploughing	Silvopastoral	sign
Soil	N	11.3±1.7b	190.3±42a	25.3±16.1b	**
	P	3.6±0.5ab	1.7±0.5b	4.8±0.9a	***
	K	39.8±3.8	43.3±3.1	39.7±1.8	ns
	Ca	46.7±1.9b	64.4±3.7a	52.7±2.4b	***
	OM	42.4±2.4a	32.0±1.8b	35.6±1.4b	**
Groundwater pollution	N. NO <sub>3</sub> <sup>-</sup>	10.9±1.8b	14.9±1.3a	14.6±2.9a	0.08



## CONCLUSIONS

- \* Maximum tree growth was observed in the ploughing and in the silvopastoral treatments, both combine with the highest level of irrigation, probably because of the highest availability of N and Ca in soil, in the former, and increased P availability in soil in the latter.
- \* Irrigation is justified not only during the early years after tree planting but also at a later stage.
- \* No response was detected due to silvopastoral treatment, because the animal stocking level was low for reducing understorey competition.
- \* The mineralization of plant litter incorporated to the soil in the clearing treatment improved soil OM. At the same time, the understorey was able to use soil nitrate, which reduces nitrate pollution.
- \* Therefore, silvopastoral systems with high stocking rates are compatible with hardwood production and are an environmentally efficient management practice.